

Shining a Light on the Role of Spasticity in Children with Diplegic CP • 1-Day Course



TARGET AUDIENCE: Rehabilitation team members, including orthotists, physical therapists, occupational therapists, physical medicine and rehabilitation physicians, and pediatric orthopedists.

LEVEL: INTERMEDIATE – Pre-course readings are assigned.

Course Description

In children born premature and those with diplegic cerebral palsy (CP), findings obtained with diffusion tensor imaging (DTI) have brought significant challenges to the common definition of CP as “a motor disorder caused by a static lesion to the upper motor neurons resulting in spasticity”. The presenter discusses findings by researchers that question the definition and challenge the common notion that spasticity is present, that it causes contracture formation and gait pathology in children with diplegia, and that it is a suitable target for "spasticity reducing" interventions.

She discusses the confusion over the difference between increased tone and hyperreflexia; challenges to the validity of the Modified Ashworth Scale and the Modified Tardieu Scale as spasticity tests; and presents abundant reported evidence of shortfalls of effectiveness of, and complications associated with commonly-administered spasticity treatments including intrathecal baclofen, botulinum toxin-A injections, and selective dorsal rhizotomy. She concludes the program with a presentation of several science-based management strategies for children with diplegic cerebral palsy and suggestions for clinical research involving clinicians in orthotics and associated rehabilitation team members.

Course Objectives

Participants in this course are expected to be able to:

- Define tone, hypertonus, and hypotonus.
- Describe ideal human resting muscle tone and the contribution of adjacent tissues.
- Discuss the relevance of physiologic adaptation to use history in terms of muscle tone.
- Describe R1 (L1, Lo) end range on the typical passive length-tension curve.
- Define an antigravity righting reaction and discuss its significance in daily life.
- Relate the stimulation of somatosensory load receptors to antigravity righting reactions.
- Discuss the role of the tactile and somatosensory systems in movement acquisition and brain mapping.
- Discuss the proof of validity of JW Lance’s definition of spasticity (1980).
- Differentiate between hyperreflexia and muscle tone.

- Describe the status of the sensory system in children with CP.
- Define a body center of mass (COM) and describe the ideal projection of the human body COM over the base of support in static standing in typically developing children of age 4 years and in adults.
- Compare the body COM projection onto the support base in typically developing toddlers to that of children with diplegia.
- Describe the muscle recruitment strategy needed to remain upright in the presence of a chronically anterior displacement of the body COM in standing and in walking. Relate this strategy to development of common soft tissue contractures in children with diplegic CP.
- Explain the validity of EMG during stretch as evidence of “spasticity”.
- Discuss the evidence of long-term effectiveness of treating “spasticity” in children with diplegic CP using intrathecal baclofen, selective dorsal rhizotomy, and Botulinum toxin-A.
- Discuss the principle of managing degrees of freedom as a postural control and motor learning strategy, and relate this principle to serial casting and orthotic design for children with diplegic CP.
- Explain the rationale for building trunk and hip control of postural alignment and the body COM as a contracture prevention and gait management strategy.
- Suggest 2 strategies for optimizing functioning sensory input
- Suggest 2 strategies for managing degrees of freedom.

Program Schedule

Start	Topic/Activity	Contact hrs
7:45	Register and settle in	
8:00	Physiologic Adaptation (Plasticity) and Typical Muscle Tone	.50
8:30	Are healthy postural control and functioning joint alignment related to the development of lower extremity muscle tone?	.50
9:00	Are postural control and loaded joint malalignment deficits related to lower limb contractures & diplegic gait pathology?	.75
9:45	Break	00
10:15	What do we know about physiologic changes comprising common lower- extremity soft-tissue contractures (hypertonus)?	.75

Start	Topic/Activity	Contact hrs
11:00	What do we know about spasticity & its role in causing deformity & gait pathology?	1.00
12:00	Lunch	00
1:00	What do we know about spasticity, continued	.50
1:30	What do we know about the long-term effects - on stability, muscle strength, deformity, and gait - of neurolytic and surgical "spasticity-reducing" interventions for children with diplegia?	1.00
2:30	Short break – 15 minutes – no food	00
2:45	Spasticity Treatment - Long-Term Effects, continued	.75
3:30	New Developments in the Management of Hypertonus in Children with Diplegia: Owning Resting Postures; Optimizing Load-Receptor Input & Responses; Targeted Training	.50
4:00	Short Break – 15 minutes - snacks	00
4:15	New Developments in Management, continued: Electrical Stimulation, Whole Body Vibration, Serial Casting, Functioning Alignment Orthoses	1.50
5:45	Questions and discussions	.25
6:00	Adjourn	Didactic Contact Hours 8.00